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THE DRAFT GUIDE SYLLABUS FOR PROFESSIONAL LEVEL STATISTICAL TRAINING: BASIC PRINCIPLES AND ASSUMPTIONS

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I. Background

1. In order to get the necessary setting for the development of the proposals leading to the introduction of the present guide syllabuses for professional training, it is relevant to trace the history of professional statistical training within the African region. In this connection, it is important to note that there are distinct differences between the systems for training in countries of English and French expression. For example, the professional statistical training centres for French-speaking countries are independent entities under their own Board of Governors or Advisory Councils, while all the English-speaking centres are located in universities and thus are guided by their regulations. This fact has to be borne in mind when examining proposals for the guide syllabuses for the two language groups.

2. In English-speaking Africa, South of the Sahara statistics as a separate discipline is of fairly recent origin. The first universities were established towards the end of the 1940s. Statistics was taught as part of mathematics or economics. Thus all those who wanted to specialize in statistics proper, had to transfer from the local universities to the London School of Economics or similar institutions. It should be noted that at that time, governments in the region did not think it advisable to employ statisticians per se. Thus, for example when the Office of the Government Statistician was established in the Gold Coast (now Ghana), it was not considered enough for a prospective professional staff to have only qualifications in statistics. He should have in addition a background in economics. It was at the beginning of 1960s that persons with other qualifications were admitted to the statistics office. At that time, the normal requirements for entry into the professional grades of the statistics office were changed to a first or second class upper degree in economics, with statistics, mathematics with statistics or sociology with statistics. These requirements had to be scaled down since the statistical office was not able to attract staff with relevant qualifications and thus persons with second class lower or even pass degrees were sometimes employed.

3. By the late 1960s and early 1970s, the need for special institutions to train statisticians in Africa had become necessary. The first Institute of Statistics in Africa was set up in Ghana in 1962 with the primary aim of providing teaching and research in statistics with emphasis on the methodology of data collection and analysis in the field of official statistics. The Institute was also to advise interested bodies on statistical design, analysis and computer programming. It should be noted that the Institute later became the Institute of Statistical, Social and Economic Research (ISSER), with expanded terms of reference. Neither institute provided for undergraduate training in statistics though the middle-level training centre at Achimota was later absorbed into ISSER.

4. The Institute of Statistics and Applied Economics at Makerere University was set up in 1969 and this was the first regional institute to provide professional statistical training mainly for the countries of the East African Community. It was planned "as an autonomous institute within Makerere University, Kampala". Its aims were to "provide facilities for the high level professional training of personnel in statistics and applied economics to meet the urgent needs of Uganda..... other countries of East Africa, as well as ..... other English-speaking African countries in the context of the formulation and implementation of

national plans for economic and social development. In 1975, it was considered appropriate to introduce the B.Stat. degree, because it was felt that the B.Sc. statistics was too academically oriented and did not provide persons who wished to become official statisticians with the necessary background for their work. By this time other universities in the region such as the University of Ghana, the University of Ibadan, the University of Botswana, Lesotho, Swaziland (later decomposed into three separate universities) and the University of Dar-es-Salaam had also initiated degree programmes in statistics.

5. The French-speaking countries followed a different pattern of development. Before 1960, most of the professional statisticians were trained at the French National School of Statistics and Economic Management (ENSAE), Paris, which is attached to the National Institute of Statistics and Economic Studies (INSEE). Two middle level centres began operations in 1961. At the same time a project was begun in Rabat at the professional level. Additional professional facilities were established in 1962 in Paris by the European Economic Community (EEC) in co-operation with the French Government, and in 1970 in Algiers. In 1967 and 1976 respectively the middle level centres in Abidjan and Yaounde also introduced professional training. In 1975, the middle level training centre in Dakar, which had trained only Senegalese candidates, started offering professional courses for students from the Sahel countries. In 1976, the Ingénieur des travaux statistiques (ITS) dvision in Paris was transferred to Kigali.

6. All these centres are autonomous and could take decisions on the course structure and content of their syllabuses without taking into account standards required in any university.

7. In spite of these developments, it was felt in 1978 that the needs of countries for professional statisticians were not being adequately met. Thus, the Statistical Training Programme for Africa was initiated in 1978, to explore ways and means of making Africa self-sufficient in statistical personnel at all levels by the 1990's.

II. Composition and terms of references of consultancy teams

8. It was with this background that the third meeting of the Directors of STPA centres recommended that two groups of consultants one for English-speaking countries and the other for French-speaking countries should prepare guide syllabuses for professional training. The consultants were:

(a) for English-speaking countries: Prof. R.M. Loynes of Sheffield University, Prof. Biyi Afonja of Ibadan University and K.T. de Graft-Johnson, Chief of ECA Statistics Division.

(b) for French-speaking countries: L. Diop, Director of CESD, Paris, P. Tassi, Director of Studies, ENSAE and R.M. Andrianasolo, Chief, Censuses and Surveys Advisory Service, ECA.

9. The terms of reference were (a) to examine existing syllabuses of the STPA centres offering professional training; (b) to provide a guide syllabus for each of the language groups, which will assist in the integration of statistics and also provide a practical orientation to the courses; (c) to try to bridge the gap between the English and French systems of professional statistical training; (d) to provide any other guidelines which would assist centres in Africa offering statistical training as well as the users of the outputs of such training centres.

III. Organization of work

10. It was agreed from the very beginning that there would be separate meetings of the two groups of consultants at the beginning of the assignment and that the first drafts on the guide syllabuses should be produced thereafter through correspondence. After the first draft had been produced, these would be circulated to Directors of statistical training centres, actual and prospective employers of statisticans and selected academic and applied statisticians both in the developed and developing world who have an interest in statistical education as far as it relates to the African region. After the comments had been received, a joint meeting of the two groups of consultants also would be arranged at a convenient location, to try to co-ordinate the work of the two groups and at the same time to revise the syllabuses in the light of the comments received.

11. The first meeting of the English-speaking group was arranged in Addis Ababa in May 1984 and a programme of work was established. It was decided that the consultants would concentrate on preparing the guide syllabus at the undergraduate levels and if time permitted the outline of work on a Masters degree programme would also be completed. It was decided that there would not be time to prepare a programme for either a graduate diploma in statistics, or any of the service courses a normal department of statistics would be required to provide for students of other departments. At a later stage, the consultants for the English-speaking group decided that it would be more appropriate to delay any work on a Masters degree programme until sufficient experience had been gained from the implementation of the recommendations for the undergraduate courses. It should be noted that consultancy missions were undertaken to Botswana, Ghana, Lesotho, Nigeria and Uganda.

12. The French-speaking group met in Paris in June 1984 after undertaking consultancy missions to Algeria, Cameroon, Ivory Coast, Morocco, Rwanda and Senegal. The group reviewed the conclusions of these missions, agreed in general terms on the course structure and content, prepared accordingly a work plan and decided on the distribution of work among its members. The work plan envisaged the completion of the draft of the guide syllabuses by October 1984 and circulation for comments soon thereafter. Unfortunately, this deadline which was the same for the English-speaking group could not be met in either case due to unforeseen circumstances. The guide syllabuses were sent out rather late in May/June 1985. Nevertheless, comments were received in time for the review meeting which was held in Amsterdam in August 1985.

IV. Course structure and content of the guide syllabus for English-speaking countries

13. As is indicated in the introduction to the guide syllabuses for English-speaking countries, certain assumptions were made with respect to the course structure and number of hours available within existing university programmes for each year of study. Note was taken of the fact that some universities run a four-year course but it was decided that it would be simpler to arrange the courses for the normal three-year programme. Institutions offering four-year courses could adapt the three-year programme to suit their particular needs. It was also decided that in furtherance of the integration of statistics, candidates for the first and second years should follow the same programme; that is, there would be no options. This approach was also for practical reasons. Candidates in the first and second years would not be in a position to determine whether they would be following an academic or the official or other applied option. It should be noted that these choices do not always depend on candidates' preferences, but on other factors such as their performance in their first two years and the availability of staff to cover the subjects in their selected option.

14. In the comments received on the first draft of the guide syllabus for English-speaking centres, most of those who commented appeared to have agreed with this principle, although one or two questioned the rationale behind the selection of demography as a compulsory subject. A few also argued that economics was irrelevant to a candidate who would follow the academic option in the third year. However as already explained, it may be premature in the first and second years for the candidate to know whether his performance would be good enough for an academic career.

15. The third problem which was also highlighted by some of those who commented on the draft guide syllabus was a large number of courses devoted to official statistics. It was agreed by some that these courses could be combined into just two, namely economic statistics and demographic and social statistics. However, the consultants felt that most official statisticians require more than a general introduction to the various topics which are covered in the official statistics option, and therefore, retained the structure outlined in the first draft with some slight modifications.

16. It was also argued by some of those who did not object to the large number of proposed official statistics courses in the third year that there was the need for adjustments to the hours allocated to some of them. It should however be noted that since the optional subjects have all equal weight, they should necessarily have the same number of hours.

17. Another point raised in the discussions on the draft guide syllabus was the fact that the French guide syllabus makes provision for all candidates to learn English but this is not the case in the English-speaking centres where no provision is made for French. The consultants however decided not to make any recommendation on this point so that each institution can decide whether to include French or not.

18. The question of how much mathematics would be needed by a candidate specialising in statistics was also examined. It would be recalled that the guide syllabus makes provision for all candidates to take mathematics in the first year. It was pointed out however, that this would not be enough especially for those who would select the academic or other applied options. In the introduction to the guide syllabus for English-speaking countries, the following comment is made: "It is assumed that one of the other first year subjects is mathematics. If mathematics is not taken as a full second year subject, some supplementary instruction on mathematics will be necessary...." If the meeting so desires, the following more detailed note on mathematics requirements could be used to substitute the existing section C.

"The syllabuses assume that mathematics will be studied in the first year as one of three subjects, each having equal weight, but no further constraint has been imposed. It is unlikely that the bare minimum will be sufficient for students to gain the greatest advantage from the statistics courses, and in any case some topics in mathematics needed for the statistics will not normally be taught before second year. Apart from actual knowledge mathematical experience and maturity is necessary. A possible way of overcoming the difficulties is to require that any student not taking mathematics as a second year subject should take a supplementary course in mathematics, not for examination, of perhaps 20 hours. Even for the first year course it may be that the mathematics is dealt with at rather too late a stage to be entirely satisfactory: lecturers will need to be on the lookout for problems of this kind.

Each centre will wish to discuss the needs in mathematics, and how they can be satisfied, in relation to the local provision of courses. However topics which are clearly needed for some parts of the statistics courses are:

Linear Algebra	: Vectors, matrices etc; eigenvectors and eigenvalues.
Calculus	: Partial differentiation; multiple integration; Taylor series.
Analysis	: Convergence; continuity
Differential Equations	
Complex Variables	
Lagrange Multipliers"	

19. As already implied, the second draft of the guide syllabus which is presented in documents E/ECA/STPA/DM.4/5 and E/ECA/STPA/DM.4/6 will be revised and published in the light of the comments made by the 4th session meeting of Directors of STPA centres. There is need to mention specifically that the syllabus for S.353/ITS326 "Agricultural Statistics" will be amended in the light of comments expected from FAO. The delay in sending their comments was due to the fact that a copy of the first draft sent to them was not received.

20. However, we have received a number of comments on this part of the syllabus already. One particular person suggested that the syllabus should be completely revised. For example, he proposed as one of the topics the following:

> "Designing Agricultural Statistical Surveys (an exercise in frame construction, sample design, questionnaire design, training of enumerators, etc.)
>
> The procedure will be to introduce the topic through a practical problem viz: an expert is confronted with the problem of estimating the number of coffee and cocoa farmers in a country. This is because a scheme is being devised whereby farmers are to be urged away from the practice of upland rice farming and into swampland rice farming and farmers with cocoa and coffee farms have a collateral for the guarantee of loans and other inputs to be supplied. A survey is to be designed to provide the necessary information".

21. In our view this proposal relates more to the way the topic should be taught rather than what should be taught. Although general guidelines have been given on the practical orientation of courses, the suggestion given above is only one of the ways of making the courses more practical oriented. Thus, it is not intended to present the guide syllabus for any course in the way suggested. The final form of S.353 will, as already stated, depend largely on comments received from FAO.

22. It is necessary to mention that some reservations have been expressed about the course content of S.315 Actural Statistics (for English-speaking centres only. The view is that the course is rather ambitious and would take more than 100 contact hours to teach. It should however be noted firstly that the course is modelled on an existing course in a British University with modification to suit conditions in Africa and secondly the intention is to teach actuarial statistics and not actuarial science, which requires a longer period of time similar to that required by the Institute of Actuaries.

23. Finally, mention must be made of the fact that the reading lists for each course as at present contained in the syllabuses especially in the guide syllabus for English-speaking centres are by no means exhaustive. Additional lists have been received since the syllabuses were revised and these will be included in the final versions.

V. Course structure and content of the guide-syllabus for French-speaking countries

24. The guide syllabus for French-speaking countries covers the ingénieur des travaux statistiques (ITS) and the ingénieur statisticien économiste course. It attempts to reconcile the views of the directors of the training centres who wish to maintain good training standards and those of the users who consider that the practical aspects of the training should be strengthened so that the new graduates could be immediately operational. The users also recommended the strengthening of planning and electronic data processing courses at STPA centres. Account has also been taken of the experiences of the STPA centres in developing their teaching programmes over time.

25. The guide syllabus has been conceived in order to allow each centre to adapt the proposed courses to its own special conditions taking into account the needs of the users, the intellectual environment of the centre, its particular objectives and the available resources. The list of courses included in the guide syllabus is not restrictive. Also, the distribution of courses per year as well as the allocation of time are given for indicative purposes only. Along the same line, the consultants have not deemed appropriate to make suggestions on the allocation of time between theory and practice since the lecturers are in a better position to do this in view of the local conditions.

26. In preparing the draft guide syllabus, the following assumptions have been made:

For the ITS level

- the duration of training is three years;
- the competitive entrance examination is open to candidates with the Baccalaureat, scientific option (A level);
- the course of study is without option or deviation at the end. However, training centres which wish to introduce options or specialisations in the third year could do so;
- there is a compulsory practical work (stage) of a minimum of three months duration, preferably at the end of the third year.

For the ISE level

- the duration of training is three years,
- the competitive entrance examination is open to candidates in the class of special mathematics or in the second year of mathematics in a Faulty of Science as well as those in the final year of study leading to Master's degree in Economics or holding ITS degree;
- the course of study is without option or deviation at the end. However, training centres could introduce option or specialisations in the third year if they wish;
- there is a compulsory practical work of a minimum of two months duration between the second and third years.

27. Since the students come basically from two different backgrounds, the mathematics and probability courses in the first year have to be adjusted to take care of those with economics and ITS background.

28. The courses are classified into four broad themes:

(i) courses where mathematics and statistics are predominant

(ii) courses relating to the economic environment

(iii) applied statistics courses, and

(iv) courses relating to the cultural environment (foreign languages, written and oral expression).

29. At the ITS level, the courses where mathematics and statistics are predominant puts emphasis on descriptive and applied statistics, including field work. Also the relations between descriptive statistics and statistical computing should not be overlooked. However, this does not mean that the mathematical statistics should be neglected.

30. In the field of economics, importance is being given to descriptive economics, national accounts, development economics, planning and project analysis courses. The necessity of considering the interrelation between economic and socio-political phenomena also justifies the introduction of a course on sociology of development. The need for other courses such as analytical accounts and management, short-term forecasting, international economics, monetary economics, marketing, etc... should be considered in the light of possibilities and the specific objectives of the individual training centres.

31. The list of applied statistics courses includes three compulsory courses: statistical computing, demography and household surveys. It is suggested that the training centres endeavour to cover at least 8 out of the remaining 15 applied statistics courses.

32. The teaching of English is considered important. Proposals are made on the organization of the course and the requirements in terms of teaching staff and teaching aids.

33. At the ISE level, the teaching programmes should combine general culture and techniques on the basis of theoretical and applied courses, particularly in statistics.

34. The economics courses account for approximately one third of the overall time allocated to the teaching programmes at this level. The first year is mainly devoted to descriptive economics as well as to micro- and macro-economics, and national accounts courses. The second year aims at completing the descriptive economics course but also and essentially studying thoroughly the theoretical economics including micro- and macro-economics. The third year includes more specialised courses such as project analysis, planning and commercial law. There is also a course on development economics which is intended to be a synthesis of the previous economics courses. There is not a separate course on economic geography since this could be taught within the framework of descriptive economics.

35. It is proposed that the ITS programme be also used for the applied statistics courses at the ISE level. However, the content of the statistical computing course in the third year should include practical exercises connected with the teaching of statistics and economics. The Demography course will be taught only in the second year. The Household Survey course is also compulsory. The teaching of other applied statistics courses will take only about 60 hours. Therefore, there is a need to make appropriate selection of the courses to be taught and to cover the remaining topics in the form of seminars. As in the ITS programme, the teaching of English is also important at this level.

VI. Implementation of the guide syllabus

36. It is realised that there will be no immediate and radical changes from existing syllabuses as a result of the proposals contained in the guide syllabuses. The changes are likely to be gradual and will necessarily take into account resources available to each institution. However, it is relevant to point out that some of these changes can be effected without too heavy an investment. For example, the official statistics courses need not be taught by full-time lecturers. In fact in certain subjects like national accounts and industrial statistics, it is not advisable to use full-time lecturers unless these lecturers are in a consultative position with a statistical office with respect to the fields they are required to teach. Thus a roster of part-time lecturers from national statistical offices and other organizations who are acceptable to the universities/ statistical training centres should be maintained.

37. ECA will, within the limits of its resources, assist centres having special problems by providing consultants on short-term basis to assist in providing some of these lectures. However, the more permanent solution is the one already outlined, namely to recruit personnel with both theoretical and practical knowledge from national or subregional sources.

38. It should also be possible to use arrangements under technical co-operation among developing countries (TCDC) to send experts in certain fields from one African country to another. Adjustments in time-tables could be made as is done at the Kigali Centre to accomodate experts who can spend only a limited time in an institution. Thus in special cases a 30-hour lecture in social statistics could be compressed into a period of 3-4 weeks. These are however matters of detail which each centre will have to tackle on its own.

VII. Conclusion

39. As already implied in this paper, ECA received a large number of useful comments. Unfortunately most of these came from developed countries and inter-governmental organizations. Very few STPA centres and African Statistical Offices sent any comments. This is regretable especially as the courses are being designed to meet the expressed wishes of African Statistical Offices for more useful courses at statistical training centres.

40. The meeting is invited to :

(a) approve the syllabuses after commenting on, and amending them if necessary;

(b) examine the suggestions for implementation and make concrete proposals on them;

(c) propose follow-up action to be taken by ECA, and

(d) make any other recommendations in connection with the guide syllabuses for professional training.